



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/681,422

10/08/2003

William J. van Ooij

UOC / 171

7421

26875

7590

03/10/2006

WOOD, HERRON & EVANS, LLP
2700 CAREW TOWER
441 VINE STREET
CINCINNATI, OH 45202

EXAMINER

FEELY, MICHAEL J

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/681,422	Applicant(s) VAN OOIJ ET AL.	
	Examiner Michael J. Feely	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-96 is/are pending in the application.
 4a) Of the above claim(s) 1-25,45 and 57-96 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-44 and 46-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0104(2), 1205</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II (claims 26-44 and 46-56) in the reply filed on January 3, 2006 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 26-44 and 46-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ooij et al. (WO 00/63462) in view of Shimakura et al. (US Pat. No. 6,475,300).

Regarding claims 26-35, 42, 43, and 44, Van Ooij et al. disclose: (26) a method of bonding a polymeric material to a metal substrate (Abstract), the method comprising: (a) applying a silane solution comprising a substantially hydrolyzed amino-silane and a substantially hydrolyzed sulfur-containing silane to at least a portion of a surface of a metal substrate (page 10, line 21 through page 18, line 22); (2) drying the silane solution on the metal substrate to form a coating (page 14, lines 3-13); and (3) applying an uncured polymeric material onto the surface of the metal substrate having the coating thereon and curing the polymeric material to bond the polymeric material to the coated metal substrate (page 14, line 14 through page 16, line 2);

(27) further comprising, prior to applying the solution: mixing an amino-silane and a sulfur-containing silane separately with an aqueous-based medium to substantially hydrolyze the amino-silane and the sulfur silane; and mixing the hydrolyzed amino-silane and the hydrolyzed

Art Unit: 1712

sulfur-containing silane together to form the solution to be applied to the metal substrate (page 11, lines 1-13); **(28)** wherein the aqueous-based medium comprises water and alcohol (page 11, lines 1-13); **(29)** wherein the amino-silane is a compound of the general formula (I) *see claim for details* (page 16, line 3 through page 17, line 13); **(30)** wherein the amino silane is selected from the group consisting bis(trimethoxysilylpropyl)ethylene diamine, bis(trimethoxysilylpropyl) amine, N-methyl-aminopropyltriethoxysilane, and combinations thereof (page 16, line 3 through page 17, line 13); **(31)** wherein the sulfur-containing silane is a compound of the general formula (II) *see claim for details* (page 17, line 14 through page 18, line 22); **(32)** wherein the sulfur-containing silane is selected from the group consisting of bis(trimethoxysilylpropyl) disulfide, bis(trimethoxysilylpropyl) tetrasulfide, and combinations thereof (page 17, line 14 through page 18, line 22);

(33) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane in a range from about 1:4 to about 4:1 by volume (page 13, lines 6-10);

(34) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane of about 1:1 by volume (page 13, lines 6-10);

(35) wherein applying the solution to the metal substrate comprises dipping the metal substrate in the solution (page 13, lines 21-28);

(43) wherein curing comprises applying heat and pressure to the polymeric material and coated metal substrate to form a bond there between (page 24, lines 20-26); and

(44) wherein the polymeric material is rubber (page 15, line 3 through page 16, line 2).

Van Ooij et al. fail to explicitly disclose: **(26)** a coating thickness in the range from about 0.1 μm to about 1 μm ; and **(42)** a coating thickness in the range from about 0.2 μm to about 0.6 μm .

Shimakura et al. also disclose a silane-based intermediate (*primer*) layer for metal substrates (Abstract; column 2, lines 29-32). After the silane-based treatment is applied, a topcoat is applied, wherein the silane-based coating imparts corrosion resistance to the metal substrate. Furthermore, they demonstrate that the coating thickness of the primer layer is a result effective variable. If the thickness is too thin, corrosion resistance is insufficient, and if the thickness is too thick, adhesion properties may be compromised (column 6, lines 5-9).

In light of this, it has been found that, “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation,” – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and “A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation,” – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide an optimized coating thickness the in process of Van Ooij et al. because the teachings of Shimakura et al. demonstrate that the primer thickness is a result effective variable, ensuring sufficient corrosion resistance and adhesion properties.

Regarding claims 36-40, Van Ooij et al. are silent regarding: **(36)** the presence of a nano-size particulate material in the silane solution; **(37)** wherein the nano-size particulate material is

Art Unit: 1712

selected from the group consisting of silica, zinc oxide, and combinations thereof; (38) wherein the nano-size particulate material has an average particle size of about 0.1 μm or less; (39) wherein the nano-size particulate material is silica in a concentration range from about 10 ppm to about 1% by weight of the solution; and (40) wherein the nano-size particulate material is silica and in a concentration range from about 50 ppm to about 1000 ppm of the solution.

As discussed above, Shimakura et al. disclose an analogous silane solution used as a primer for metal substrates and polymeric coatings. In addition to their silanes, they disclose, "The metallic surface-treatment agent of the present invention comprises water-dispersible silica. The water-dispersible silica which can be used is not particularly restricted...The spherical silica includes colloidal silica such as *Snowtex N*, *Snowtex UP*...The above water-dispersible silica is formulated in a concentration of 0.05 to 100 g/l, preferably 0.5 to 60 g/l...If the concentration of water-dispersible silica is less than 0.05 g/l, the corrosion resistance-improving effect will be insufficient, while the use of silica in excess of 100 g/l will not be rewarded with any further improvement in corrosion resistance but rather detract from bath stability of the metallic surface-treating agent," (column 3, lines 19-40)

The teachings of Shimakura et al. demonstrate the following: (1) they add nano-size silica having an average particle size of about 0.1 μm or less (*see product sheet for Snowtex products*) to provide a corrosion resistance property to their silane-based primer; and (2) the concentration of the silica nano-particles is a result effective variable, ensuring desired corrosion-resistance and bath stability.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a nano-size silica having an average particle size of about 0.1 μm or less

Art Unit: 1712

(limitations of claims 36-38), as taught by Shimakura et al., in the solution used in the method of Van Ooij et al. because Shimakura et al. disclose an analogous silane-based primer, wherein these silica materials are added as a surface-treating agent, resulting in corrosion resistance for the primed and top-coated metal substrate.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide these silica nano-particles in an optimized concentration range (limitations of claims 39-40) in the solution used in the method of Van Ooij et al. because the teachings of Shimakura et al. demonstrate that this concentration range is a result effective variable, ensuring corrosion-resistance and bath stability.

Regarding claim 41, Van Ooij et al. fail to explicitly disclose: (41) wherein drying comprises heating the silane solution on the metal substrate to a temperature of at least about 60°C.

Shimakura et al. also discuss drying conditions for their analogous silane-based primer. They disclose, “the drying procedure can be carried out at room temperature to 250°C for 2 seconds to 5 minutes. If the limit of 250°C is exceeded, adhesion and corrosion resistance will be adversely affected. Preferred conditions are 40~180°C x 5 seconds ~ 2 minutes,” (column 5, lines 29-33).

The teachings of Shimakura et al. demonstrate that drying temperature is a result effective variable, ensuring proper adhesion and corrosion resistance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to dry the silane-based coating in the method of Van Ooij et al. at an optimized

Art Unit: 1712

temperature because the teachings of Shimakura et al. demonstrate that this temperature range is a result effective variable, ensuring proper adhesion and corrosion resistance.

Regarding claims 46-56, the combined teachings of Ooij et al. and Shimakura et al. are as set forth above and incorporated herein to obviously satisfy all of the limitations set forth in claims 46-56.

4. Claims 26-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ooij et al. (WO 00/63303) in view of Shimakura et al. (US Pat. No. 6,475,300). The Van Ooij et al. reference was cited as an X-reference in a related international search report.

Regarding claims 26-35 and 42, Van Ooij et al. disclose: **(26)** a method of bonding a polymeric material to a metal substrate (Abstract), the method comprising: (a) applying a silane solution comprising a substantially hydrolyzed amino-silane and a substantially hydrolyzed sulfur-containing silane to at least a portion of a surface of a metal substrate (page 15, lines 15-29); (2) drying the silane solution on the metal substrate to form a coating (page 16, lines 19-31); and (3) applying an uncured polymeric material onto the surface of the metal substrate having the coating thereon and curing the polymeric material to bond the polymeric material to the coated metal substrate (page 17, line 1 through page 18, line 2);

(27) further comprising, prior to applying the solution: mixing an amino-silane and a sulfur-containing silane separately with an aqueous-based medium to substantially hydrolyze the amino-silane and the sulfur silane; and mixing the hydrolyzed amino-silane and the hydrolyzed sulfur-containing silane together to form the solution to be applied to the metal substrate (page 15, lines 15-29); **(28)** wherein the aqueous-based medium comprises water and alcohol (page 15,

Art Unit: 1712

lines 15-29); **(29)** wherein the amino-silane is a compound of the general formula (I) *see claim for details* (page 10, line 5 through page 11, line 21); **(30)** wherein the amino silane is selected from the group consisting bis(trimethoxysilylpropyl)ethylene diamine, bis(trimethoxysilylpropyl) amine, N-methyl-aminopropyltriethoxysilane, and combinations thereof (page 10, line 5 through page 11, line 21); **(31)** wherein the sulfur-containing silane is a compound of the general formula (II) *see claim for details* (page 12, line 1 through page 13, line 3); **(32)** wherein the sulfur-containing silane is selected from the group consisting of bis(trimethoxysilylpropyl) disulfide, bis(trimethoxysilylpropyl) tetrasulfide, and combinations thereof (page 12, line 1 through page 13, line 3);

(33) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane in a range from about 1:4 to about 4:1 by volume (page 14, lines 17-24);

(34) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane of about 1:1 by volume (page 14, lines 17-24); and

(35) wherein applying the solution to the metal substrate comprises dipping the metal substrate in the solution (page 16, lines 4-11).

Van Ooij et al. fail to explicitly disclose: **(26)** a coating thickness in the range from about 0.1 μm to about 1 μm ; and **(42)** a coating thickness in the range from about 0.2 μm to about 0.6 μm .

Shimakura et al. also disclose a silane-based intermediate (*primer*) layer for metal substrates (Abstract; column 2, lines 29-32). After the silane-based treatment is applied, a topcoat is applied, wherein the silane-based coating imparts corrosion resistance to the metal

Art Unit: 1712

substrate. Furthermore, they demonstrate that the coating thickness of the primer layer is a result effective variable. If the thickness is too thin, corrosion resistance is insufficient, and if the thickness is too thick, adhesion properties may be compromised (column 6, lines 5-9).

In light of this, it has been found that, “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation,” – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and “A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation,” – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide an optimized coating thickness the in process of Van Ooij et al. because the teachings of Shimakura et al. demonstrate that the primer thickness is a result effective variable, ensuring sufficient corrosion resistance and adhesion properties.

Regarding claims 36-40, Van Ooij et al. are silent regarding: **(36)** the presence of a nano-size particulate material in the silane solution; **(37)** wherein the nano-size particulate material is selected from the group consisting of silica, zinc oxide, and combinations thereof; **(38)** wherein the nano-size particulate material has an average particle size of about 0.1 μm or less; **(39)** wherein the nano-size particulate material is silica in a concentration range from about 10 ppm to about 1% by weight of the solution; and **(40)** wherein the nano-size particulate material is silica and in a concentration range from about 50 ppm to about 1000 ppm of the solution.

As discussed above, Shimakura et al. disclose an analogous silane solution used as a primer for metal substrates and polymeric coatings. In addition to their silanes, they disclose, “The metallic surface-treatment agent of the present invention comprises water-dispersible silica. The water-dispersible silica which can be used is not particularly restricted...The spherical silica includes colloidal silica such as *Snowtex N*, *Snowtex UP*...The above water-dispersible silica is formulated in a concentration of 0.05 to 100 g/l, preferably 0.5 to 60 g/l...If the concentration of water-dispersible silica is less than 0.05 g/l, the corrosion resistance-improving effect will be insufficient, while the use of silica in excess of 100 g/l will not be rewarded with any further improvement in corrosion resistance but rather detract from bath stability of the metallic surface-treating agent,” (column 3, lines 19-40)

The teachings of Shimakura et al. demonstrate the following: (1) they add nano-size silica having an average particle size of about 0.1 μm or less (*see product sheet for Snowtex products*) to provide a corrosion resistance property to their silane-based primer; and (2) the concentration of the silica nano-particles is a result effective variable, ensuring desired corrosion-resistance and bath stability.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a nano-size silica having an average particle size of about 0.1 μm or less (*limitations of claims 36-38*), as taught by Shimakura et al., in the solution used in the method of Van Ooij et al. because Shimakura et al. disclose an analogous silane-based primer, wherein these silica materials are added as a surface-treating agent, resulting in corrosion resistance for the primed and top-coated metal substrate.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide these silica nano-particles in an optimized concentration range (*limitations of claims 39-40*) in the solution used in the method of Van Ooij et al. because the teachings of Shimakura et al. demonstrate that this concentration range is a result effective variable, ensuring corrosion-resistance and bath stability.

Regarding claim 41, Van Ooij et al. fail to explicitly disclose: **(41)** wherein drying comprises heating the silane solution on the metal substrate to a temperature of at least about 60°C.

Shimakura et al. also discuss drying conditions for their analogous silane-based primer. They disclose, “the drying procedure can be carried out at room temperature to 250°C for 2 seconds to 5 minutes. If the limit of 250°C is exceeded, adhesion and corrosion resistance will be adversely affected. Preferred conditions are 40~180°C x 5 seconds ~ 2 minutes,” (column 5, lines 29-33).

The teachings of Shimakura et al. demonstrate that drying temperature is a result effective variable, ensuring proper adhesion and corrosion resistance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to dry the silane-based coating in the method of Van Ooij et al. at an optimized temperature because the teachings of Shimakura et al. demonstrate that this temperature range is a result effective variable, ensuring proper adhesion and corrosion resistance.

Art Unit: 1712

5. Claims 26-44 and 46-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ooij et al. (US Pat. No. 6,416,869) in view of Shimakura et al. (US Pat. No. 6,475,300).

This is a US-equivalent of another X-reference cited in the international search report.

Regarding claims 26-35, 42, 43, and 44, Van Ooij et al. disclose: **(26)** a method of bonding a polymeric material to a metal substrate (Abstract), the method comprising: (a) applying a silane solution comprising a substantially hydrolyzed amino-silane and a substantially hydrolyzed sulfur-containing silane to at least a portion of a surface of a metal substrate (column 6, line 28 through column 11, line 46); (2) drying the silane solution on the metal substrate to form a coating (column 8, lines 37-51); and (3) applying an uncured polymeric material onto the surface of the metal substrate having the coating thereon and curing the polymeric material to bond the polymeric material to the coated metal substrate (column 8, line 52 through column 9, line 52);

(27) further comprising, prior to applying the solution: mixing an amino-silane and a sulfur-containing silane separately with an aqueous-based medium to substantially hydrolyze the amino-silane and the sulfur silane; and mixing the hydrolyzed amino-silane and the hydrolyzed sulfur-containing silane together to form the solution to be applied to the metal substrate (column 6, lines 43-47); **(28)** wherein the aqueous-based medium comprises water and alcohol (column 6, lines 29-47); **(29)** wherein the amino-silane is a compound of the general formula (I) *see claim for details* (column 9, line 42 through column 10, line 65); **(30)** wherein the amino silane is selected from the group consisting bis(trimethoxysilylpropyl)ethylene diamine, bis(trimethoxysilylpropyl) amine, N-methyl-aminopropyltriethoxysilane, and combinations thereof (column 9, line 42 through column 10, line 65); **(31)** wherein the sulfur-containing silane

Art Unit: 1712

is a compound of the general formula (II) *see claim for details* (column 10, line 66 though column 12, line 27); (32) wherein the sulfur-containing silane is selected from the group consisting of bis(trimethoxysilylpropyl) disulfide, bis(trimethoxysilylpropyl) tetrasulfide, and combinations thereof (column 10, line 66 though column 12, line 27);

(33) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane in a range from about 1:4 to about 4:1 by volume (column 7, line 59 through column 8, line 18);

(34) wherein the solution comprises a ratio of the hydrolyzed amino-silane to the hydrolyzed sulfur-containing silane of about 1:1 by volume (column 7, line 59 through column 8, line 18);

(35) wherein applying the solution to the metal substrate comprises dipping the metal substrate in the solution (column 8, line 19-36);

(43) wherein curing comprises applying heat and pressure to the polymeric material and coated metal substrate to form a bond there between (column 15, lines 10-18); and

(44) wherein the polymeric material is rubber (column 9, lines 12-52).

Van Ooij et al. fail to explicitly disclose: (26) a coating thickness in the range from about 0.1 μm to about 1 μm ; and (42) a coating thickness in the range from about 0.2 μm to about 0.6 μm .

Shimakura et al. also disclose a silane-based intermediate (*primer*) layer for metal substrates (Abstract; column 2, lines 29-32). After the silane-based treatment is applied, a topcoat is applied, wherein the silane-based coating imparts corrosion resistance to the metal substrate. Furthermore, they demonstrate that the coating thickness of the primer layer is a result

Art Unit: 1712

effective variable. If the thickness is too thin, corrosion resistance is insufficient, and if the thickness is too thick, adhesion properties may be compromised (column 6, lines 5-9).

In light of this, it has been found that, “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation,” – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and “A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation,” – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide an optimized coating thickness the in process of Van Ooij et al. because the teachings of Shimakura et al. demonstrate that the primer thickness is a result effective variable, ensuring sufficient corrosion resistance and adhesion properties.

Regarding claims 36-40, Van Ooij et al. are silent regarding: **(36)** the presence of a nano-size particulate material in the silane solution; **(37)** wherein the nano-size particulate material is selected from the group consisting of silica, zinc oxide, and combinations thereof; **(38)** wherein the nano-size particulate material has an average particle size of about 0.1 μm or less; **(39)** wherein the nano-size particulate material is silica in a concentration range from about 10 ppm to about 1% by weight of the solution; and **(40)** wherein the nano-size particulate material is silica and in a concentration range from about 50 ppm to about 1000 ppm of the solution.

As discussed above, Shimakura et al. disclose an analogous silane solution used as a primer for metal substrates and polymeric coatings. In addition to their silanes, they disclose,

Art Unit: 1712

“The metallic surface-treatment agent of the present invention comprises water-dispersible silica. The water-dispersible silica which can be used is not particularly restricted...The spherical silica includes colloidal silica such as *Snowtex N*, *Snowtex UP*...The above water-dispersible silica is formulated in a concentration of 0.05 to 100 g/l, preferably 0.5 to 60 g/l...If the concentration of water-dispersible silica is less than 0.05 g/l, the corrosion resistance-improving effect will be insufficient, while the use of silica in excess of 100 g/l will not be rewarded with any further improvement in corrosion resistance but rather detract from bath stability of the metallic surface-treating agent,” (column 3, lines 19-40)

The teachings of Shimakura et al. demonstrate the following: (1) they add nano-size silica having an average particle size of about 0.1 μm or less (*see product sheet for Snowtex products*) to provide a corrosion resistance property to their silane-based primer; and (2) the concentration of the silica nano-particles is a result effective variable, ensuring desired corrosion-resistance and bath stability.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a nano-size silica having an average particle size of about 0.1 μm or less (*limitations of claims 36-38*), as taught by Shimakura et al., in the solution used in the method of Van Ooij et al. because Shimakura et al. disclose an analogous silane-based primer, wherein these silica materials are added as a surface-treating agent, resulting in corrosion resistance for the primed and top-coated metal substrate.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide these silica nano-particles in an optimized concentration range (*limitations of claims 39-40*) in the solution used in the method of Van Ooij et al. because the

Art Unit: 1712

teachings of Shimakura et al. demonstrate that this concentration range is a result effective variable, ensuring corrosion-resistance and bath stability.

Regarding claim 41, Van Ooij et al. fail to explicitly disclose: **(41)** wherein drying comprises heating the silane solution on the metal substrate to a temperature of at least about 60°C.

Shimakura et al. also discuss drying conditions for their analogous silane-based primer. They disclose, “the drying procedure can be carried out at room temperature to 250°C for 2 seconds to 5 minutes. If the limit of 250°C is exceeded, adhesion and corrosion resistance will be adversely affected. Preferred conditions are 40~180°C x 5 seconds ~ 2 minutes,” (column 5, lines 29-33).

The teachings of Shimakura et al. demonstrate that drying temperature is a result effective variable, ensuring proper adhesion and corrosion resistance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to dry the silane-based coating in the method of Van Ooij et al. at an optimized temperature because the teachings of Shimakura et al. demonstrate that this temperature range is a result effective variable, ensuring proper adhesion and corrosion resistance.

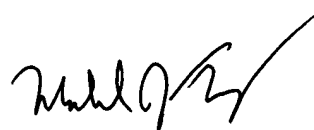
Regarding claims 46-56, the combined teachings of Ooij et al. and Shimakura et al. are as set forth above and incorporated herein to obviously satisfy all of the limitations set forth in claims 46-56.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is 571-272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael J. Feely
Primary Examiner
Art Unit 1712

March 6, 2006

**MICHAEL FEELY
PRIMARY EXAMINER**